

**TITLE:** DIVERSITY AND MICROBIAL COMPOSITION FROM GRANULATED SLUDGE OF UASB REACTOR USED IN SWINE WASTEWATER TREATING

**AUTHORS:** SAKAMOTO, I.K.<sup>1</sup>, AHMAD, F.<sup>1</sup>, VARESCHE, M.B.A.<sup>1</sup>

**INSTITUTION:** <sup>1</sup>EESC - ESCOLA DE ENGENHARIA DE SÃO CARLOS (AVENIDA TRABALHADOR SÃO-CARLENSE, 400 – CENTRO CEP: 13566-590), USP - UNIVERSIDADE DE SÃO PAULO (USP), SÃO CARLOS/SP, BRASIL

### **ABSTRACT**

The granulated sludge from the UASB reactor treating swine wastewater is used as an inoculum in the degradation of toxic compounds, complex recalcitrant compounds, , as well as hydrogen production. The knowledge of the diversity and microbial composition of the granulated sludge is important to assist in the operation of the reactors that use this inoculum as microbial consortium. The present study evaluated the composition of the microbial community using 16S rRNA gene and Illumina MiSeq next-generation sequencer. 126,004 reads were assigned to Bacteria domain; 8583 to Archaea domain and 4130 were unassigned. Sequences were grouped into 2843 OTUs for Bacteria, 44 OTUSs for Archaea. The phyla with greater relative abundance (represented by the Classes) for Bacteria domain were: Proteobacteria (*Alpha, Beta, Gamma, Delta and Epsilonprotobacteria*); Bacteroidetes (*Bacteroidia, Flavobacteria, Sphingobacteriia, Cytophagia and Saprospirae*); Firmicutes, (*Clostridia, Bacilli and Erysipelotrichi*); WWE1 (*[Cloacamonae]*); Chloroflexi (*Anaerolineae, Chloroflexi and Dehalococcoidetes*); Synergistetes (*Synergistia*); Spirochaetes (*Spirochaetes and [Leptospirae]*) and other phyla (> 3.35%). The metabolic diversity of the microbial consortium was related to the oxidation of ammonia and sulfide; reduction of sulfate and nitrite; degradation of aromatic hydrocarbon, xylan and dehalogenation; nitrogen fixation. At the genus level 65% were unclassified with the NCBI and RDP databases. For the Archaea domain the predominant phyla (represented by the Classes) were Euryarchaeota (*Methanobacteria, Methanomicrobia and Thermoplasmata*) and Crenarchaeota (*MCG*). The genus with the highest relative abundance (73%) was *Methanosaeta* sp. which is responsible for the direct conversion of acetate to methane and is predominant in most anaerobic methanogenic environments or anaerobic digestion and the precursor to methane production. The Shannon diversity index was 5.72 and the Chao-1 richness was 2988. The information presented could help using this microbial consortium as inoculum in future research.

**Keywords:** Bacteria, Archaea, Granulated sludge, Illumina MiSeq, Swine wastewater

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